MISSISSIPPI

STATEWIDE ARCHITECTURE & TECHNOLOGY INFRASTRUCTURE PLAN

2017 | 2019

ITS Mississippi Department of
Information Technology Services

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Introduction

STRATEGIC OBJECTIVES

Each year the Mississippi Department of Information Technology Services (ITS) publishes the *Mississippi Statewide Architecture and Technology Infrastructure Plan* to inform the Governor and the Legislature, the ITS Board, state agencies and institutions, and information technology (IT) vendors about ongoing and planned statewide technology infrastructure initiatives impacting state government.

This Plan references details pertaining to the core architecture domains of the statewide infrastructure and the IT projects planned for each domain. ITS harnesses internal research capabilities and vendor relationships to keep pace with evolving infrastructure technologies, incorporating these technologies into strategic plans and projects when advantageous to the state. Of equal importance, ITS assesses changes in infrastructure requirements and technology through interactive agency and institution planning processes, emerging technology initiatives, and participation in and tracking of infrastructure projects.

An online version of the *Mississippi Statewide Architecture and Technology Infrastructure Plan* can be viewed by visiting the ITS website at www.its.ms.gov.

SCOPE

The mission of ITS is to provide trusted technology resources and services that offer proven value to all stakeholders in Mississippi government. The rapid evolution and expansive growth of data, voice, and video technologies provides a continuous challenge to seamless integration of technology resources and services that are customer-centric, scalable, secure, efficient, and effective.

In this diverse technical ecosystem, the Legislature has tasked ITS with providing statewide services that facilitate cost-effective information technology and telecommunication solutions that can be shared with all state agencies. In addition, ITS, with the full cooperation of state agencies, strives to identify opportunities to minimize duplication, reduce costs, and improve the efficiency of providing common technology services across state agency boundaries.

ITS is committed

to ensuring that the State of Mississippi receives the maximum use and benefit from information technology and services and to assisting agencies as they strive to reduce costs by capitalizing on shared technology.

As depicted below, the Mississippi statewide architecture and technology infrastructure has elements which are decentralized, federated, and unified, producing a model consisting of the domains detailed within this document, utilizing communication and computing technologies, web-based computing applications, networking technologies, management tools, strategic planning, and human resources to provide state agencies with the essential tools to accomplish their missions. Through the optimization of information technologies and telecommunication networks, state government in Mississippi is arching toward a cooperative statewide enterprise, built upon a common architecture.

Statewide Technology Delivery Model
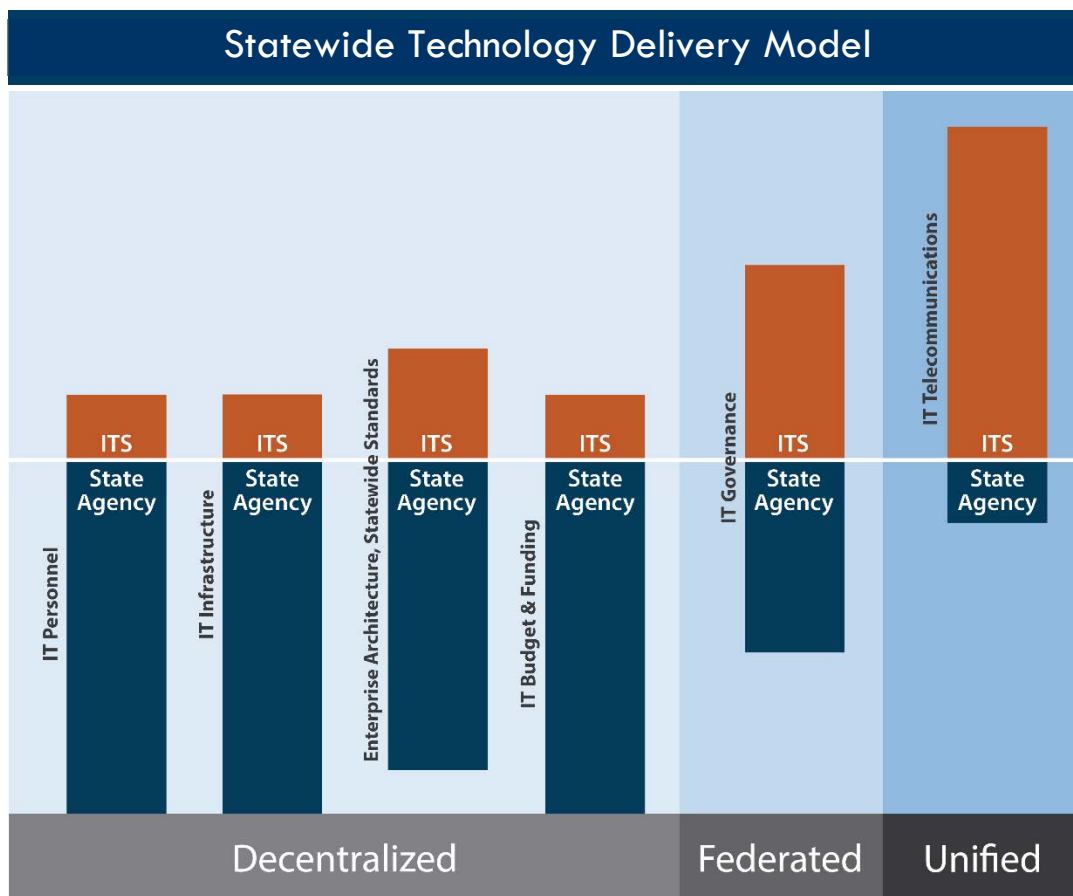
For the purpose of this Plan, the "statewide architecture and technology infrastructure" is defined as "those architecture domains that together offer, through connectivity, the potential for state entities to communicate with each other using voice, video, and data." To that end, certain local infrastructure components located within state agencies are not considered a part of the statewide architecture and infrastructure, but are considered local technology infrastructure for a particular building, agency, institution, or campus.

Plan Overview

GUIDING PRINCIPLES

The guiding principles are shared, long-lasting beliefs that hold true across the statewide, shared technology infrastructure. The following principles provide a rationale for adherence, serve as starting points for difficult evaluations and decisions, and guide the design and selection of technology components.

Business Drives Information Technology	**Statewide Enterprise Focus**	**Common Business Solutions**
Secure Enterprise Information	**Principles of Statewide Architecture & Infrastructure**	**Compliance with National and Statewide Standards**
Continuous Improvement	**Minimize Technical Diversity**	**Business Continuity**
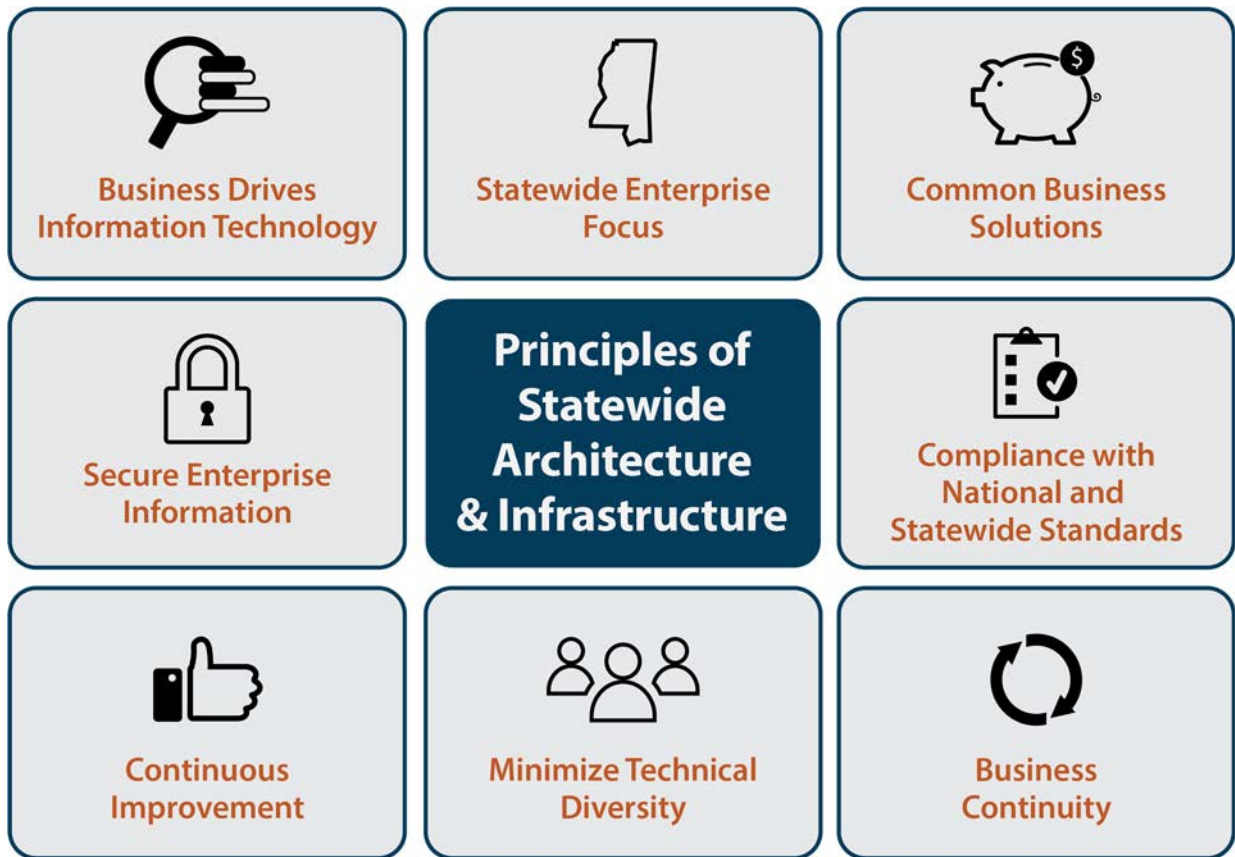
An enterprise as diverse as the state can benefit from a set of shared foundational beliefs. Without architectural principles, IT management decisions are guided by varied preferences or assumptions, often resulting in both ineffective and inefficient technology investments.

PRINCIPLE	RATIONALE
Business Drives Information Technology **1**	• Align and optimize IT resources with changing needs of state entities and local governing authorities. • Enable the effective implementation of state business strategies. • Highlight and promote the value of IT to executives and policy makers.
Statewide Enterprise Focus **2**	• Reduce implementation and support costs through a consistent enterprise-wide approach to IT solutions. • Consolidate or integrate existing systems and technical infrastructure. • Provide the IT foundation to support the business processes of state entities and local governing authorities.
Common Business Solutions **3**	• Share and re-use IT assets. • Ensure interoperability by eliminating technology silos. • Share and re-use IT assets.
Secure Enterprise Information **4**	• Reduce the security risks of the state's IT infrastructure and data. • Increase support for funding a functional, secure, and reliable infrastructure. • Improve deliver, efficiency, and accessibility of government services to the public.
Compliance with National and Statewide Standards **5**	• Support the statewide IT vision. • Align with national compliance standards. • Increase the consistency, accessibility, and sharing of data and applications.
Continuous Improvement **6**	• Ensure IT efforts support the state's evolving business needs. • Leverage the advantages of new technologies while balancing investments in existing systems. • Respond to agency changes in technology and business requirements.
Minimize Technical Diversity **7**	• Reduce costs by eliminating redundant investments in technology. • Increase the consistency, accessibility, and sharing of data.
Business Continuity **8**	• Support the high-availability required for state and local governing authority missions. • Ensure a stable, long term, and viable technology environment. • Improve recoverability of critical government services after a disaster.

STRATEGIC MASTER PLAN SUMMARY

Each year, ITS publishes the *Mississippi Strategic Master Plan for Information Technology* and the *Mississippi Statewide Architecture and Infrastructure Plan*. Both documents are widely utilized to gain a clear overview of technology plans and programs affecting state government.

The *Strategic Master Plan* documents high-level technology initiatives in rolling 3-year increments, by establishing a common set of focused statewide strategies and goals for the state's information technology (IT) enterprise. The *Statewide Architecture and Infrastructure Plan* provides similar, but more detailed information from a technology infrastructure perspective. These expansive enterprise plans in no way supplant the business-oriented plans of individual state agencies. As companion planning documents, the *Strategic Master Plan* and the *Statewide Architecture and Infrastructure Plan* assist agencies in aligning their use of technology with the direction established for the state's IT enterprise. Technologies highlighted in this plan are intended for use by all state agencies regardless of their mission or complexity.

The shared infrastructure components implemented by ITS and outlined in the *Mississippi Statewide Architecture and Infrastructure Plan* provide direct support for the goals and strategies presented in the *Mississippi Strategic Master Plan for Information Technology*.

STRATEGIC MASTER PLAN GOALS AND STRATEGIES

GOAL 1 — Provide, Protect, and Support Enterprise Technology Infrastructure Components to Enable the Effective and Efficient Use of Information Technology

STRATEGIES

- Utilize fully the Primary and Co-Processing Data Centers' technology infrastructure services
- Provide, manage, and facilitate efficient and cost-effective usage of telecommunication services
- Provide, protect, and support enterprise technology infrastructure components to strengthen the security posture of the state
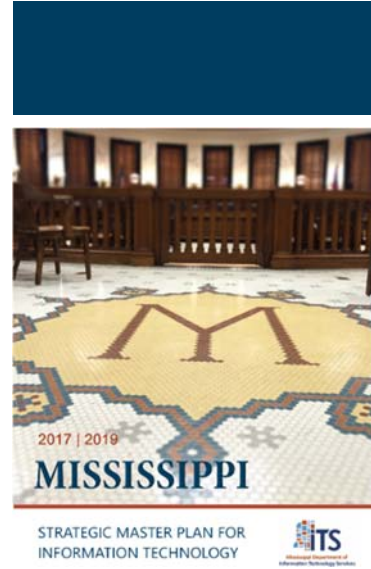
As companion planning documents, the *Strategic Master Plan* and the *Statewide Architecture and* Technology *Infrastructure Plan* assist agencies in **ALIGNING** their use of **TECHNOLOGY** with the **DIRECTION** established for the state's IT enterprise.

GOAL 2 Investigate, Develop, and Promote Enterprise Business and Technology Solutions to Maximize the Benefits of Shared Services

STRATEGIES

- Implement and promote digital government and mobile solutions to deliver public sector services
- Implement an effective and efficient enterprise email service for state government
- Investigate, propose, and implement an effective and efficient enterprise disaster recovery service
- Investigate, propose, and implement an effective and efficient enterprise hybrid cloud solution for state government

GOAL 3 Promote the Funding, Procurement, and Management of Information Technology as a Strategic Investment

STRATEGIES

- Initiate innovative and collaborative procurement strategies and practices
- Raise awareness and seek alignment of the IT investment process
- Enhance contract management strategies and practices
- Provide innovative and timely information technology training to state employees

GOAL 4 Promote Statewide Sharing of Information Technology Between all State Agencies to Foster a Collaborative Approach to the Innovative and Digital Transformation of Government

STRATEGIES

- Develop a technology blueprint that drives improved IT coordination and investment
- Facilitate and coordinate inclusive planning and outreach processes across state government
- Continue emerging technology research and strategic private sector relationships
- Provide effective communications via media-related activities to improve communication with all partner agencies, advance agency's mission and vision, and encourage public interaction

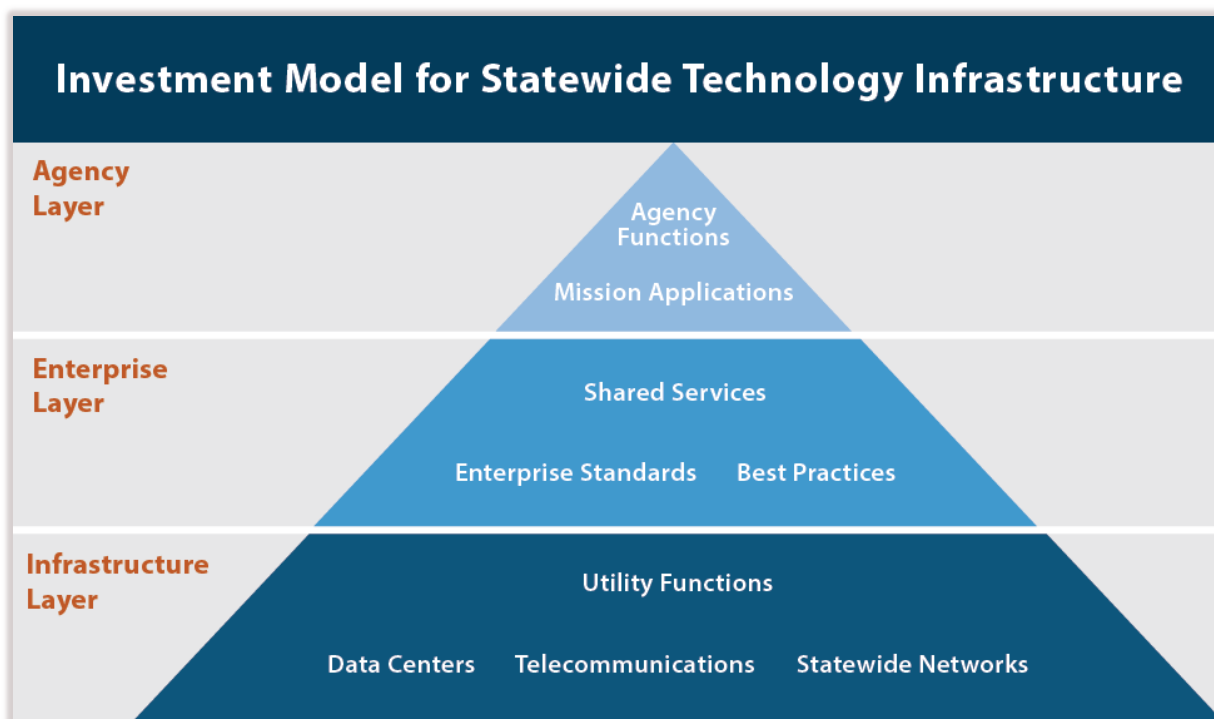## STATEWIDE STRATEGIC GOALS MAPPED TO GUIDING PRINCIPLES

The following table shows the relationship between the statewide architecture principles and the state's strategic goals established in the *2017-2019 Mississippi Strategic Master Plan for Information Technology.*

Statewide Strategic Goal	Related Statewide Enterprise Architecture Principle(s)
Provide, protect, and support enterprise technology infrastructure components to enable the effective and efficient use of information technology	➢ Principle #4 Secure Enterprise Information ➢ Principle #8 Business Continuity
Investigate, develop, and promote enterprise business and technology solutions to maximize the benefits of shared services	➢ Principle #1 Business Drives Information Technology ➢ Principle #3 Common Business Solutions
Promote the funding, procurement, and management of information technology as a strategic investment	➢ Principle #2 Statewide Enterprise Focus ➢ Principle #6 Continuous Improvement
Promote statewide sharing of information technology between all state agencies to foster a collaborative approach to the innovative and digital transformation of government	➢ Principle #5 Compliance with National and Statewide Standards ➢ Principle #7 Minimize Technical Diversity

Shared Technology Infrastructure Investment

INVESTMENT MODEL FOR STATEWIDE INFRASTRUCURE

A shared technology architecture and technology infrastructure is the basis for a federated model of governance. A federated model is made up of three layers that build upon one another to support state government missions.

Investment Model for Statewide Technology Infrastructure

Agency Layer — Agency Functions, Mission Applications

Enterprise Layer — Shared Services, Enterprise Standards, Best Practices

Infrastructure Layer — Utility Functions, Data Centers, Telecommunications, Statewide Networks

As part of the state's infrastructure layer, functions needed by many agencies that are not specific to individual environments, such as data center operations, are managed as a part of a shared technology infrastructure. This is similar to utility services – it is not appropriate for each agency to design and build a custom telephone system when feature rich and interoperable systems are available. These services must be highly reliable, cost effective, and serve as the foundation for agency mission applications.

The enterprise layer consists of the standards that ensure interoperability and consistent best practices across state government. This common set of policies, standards, and guidelines will form

a responsive and flexible architecture. This layer represents an area of shared responsibility among state agencies.

The agency layer ("agency" in this model encompasses state entities and governing authorities) is composed of functions that are directly and uniquely aligned with the execution of each agency's mission. Each agency retains the flexibility to focus on innovation that directly advances its mission while building on the established infrastructure of the state. As agencies innovate independently, by utilizing the shared enterprise resources, a statewide return on investment model and quality assurance reviews provide consistent methods to allow independent projects to be compared and prioritized. Mississippi state government can leverage the value of its technology investments in three different areas:

Increased Cost Effectiveness – The state can spread the cost of service over multiple agencies, fully leveraging the state's purchasing power. Bringing these efficiencies to bear allows more agencies the ability to make use of the service, further expanding the economies of scale. Properly implemented, a shared enterprise architecture and technology infrastructure encourages collaboration, reuse of intellectual capital, and better long-term cost models.

Improved Service Delivery – Administrators of a shared infrastructure will develop deeper skills and, therefore, provide better and frequently lower cost service to all end users. Agencies unable to dedicate employees to critical functions, such as network and data security, will have improved and consistent access to resources.

Focus on Core Missions – When directors and technologists are relieved of some of the burdens of managing tactical IT issues, their agencies are in a better position to assess and act on those technologies that advance their core missions and directly add value to the lives of the citizens.

FUNDING THE SHARED TECHNOLOGY INFRASTRUCTURE

The National Association of State Chief Information Officers (NASCIO) and the National Governors Association (NGA) strongly emphasize the need for a strategic IT investment process which ensures that state agencies utilize innovative, smart-buying, investment techniques. With IT becoming a critical component of state government infrastructure, many states have focused on using IT to solve problems in government operations. Currently, the budgeting and funding of IT within Mississippi state government is accomplished on an agency-by-agency basis.

Many opportunities exist that the state can leverage to accomplish an increasingly strategic investment of IT resources, including strategically planning for upgrades, transferring cost savings to fund applications, and implementing return-on-investment programs. Industry best practices suggest that in order to achieve maximum efficiency, IT commonality should be increased and similar IT resources should be shared between all agencies, divisions, and departments of the larger enterprise. In order to achieve this enterprise statewide view and strategic investment of state IT resources, full collaboration is needed between state agencies and ITS.

For state government to be as responsive and cost effective as possible, it is essential to have a clear view of statewide goals and how to achieve them. Technology will have the greatest impact

on the state if implemented in a way that fosters sharing and collaboration between all state agencies. ITS seeks to be an enabler of agencies statewide goals through the use of technology. When technology is implemented at the enterprise statewide layer, it can be shared and utilized by all state agencies.

FUNDING TELECOMMUNICATIONS VIA UNIVERSAL SERVICE

The Communications Act of 1934 stated that all people in the United States should have access to "rapid, efficient, nationwide communications service with adequate facilities at reasonable charges." In the Telecommunications Act of 1996, Congress further refined this goal, decreeing that it is federal policy to provide support for services "essential to education, public health, or public safety" and that all people, regardless of location or income level, should continue to have affordable access to telecommunications and information services. This concept, as defined here, has come to be known as "universal service."

The support mechanisms necessary to achieve universal service are administered by the Universal Service Administrative Company (USAC), www.usac.org, an independent, not-for-profit organization regulated by the Federal Communications Commission (FCC), www.fcc.gov. USAC provides universal service support through these four programs:

1. **Connect America Fund**
   This program supports telephone companies that serve high-cost areas.
2. **Low Income**
   This program assists low-income customers by helping to pay for monthly telephone charges as well as connection charges.
3. **Rural Health Care**
   This program allows rural health care providers to pay rates for telecommunications services similar to those of their urban counterparts.
4. **Schools and Libraries**
   This program, popularly known as "E-Rate," provides discounted Internet access, internal connections, and telecommunications services to schools and libraries.

Schools and Libraries (E-Rate)

The Schools and Libraries Program www.usac.org/sl was established by Congress to help make advanced telecommunications affordable for the nation's K-12 schools and libraries. It provides discounts ranging from 20% to 90% on the costs of eligible telecommunications services, Internet access, and internal connections. The highest discounts go to the schools and libraries serving the most disadvantaged populations, where over 50% of the students in the district qualify for the National School Lunch Program.

During the past 19 years of the E-Rate program, schools and libraries in Mississippi have received over $650 million dollars in credits. ITS fills several roles related to E-Rate:

⇒ **Master Contracts** - ITS posts Form 470s and issues Request for Proposals (RFPs) to establish E-Rate eligible master contracts from which schools and libraries can receive E-Rate eligible services. Examples of these services are: Wide Area Networking Circuits, Internet Access, Voice Services, and Cellular Service.

⇒ **State Level Coordination** – ITS works with the Mississippi Department of Education, the Mississippi Library Commission, and service providers throughout the E-Rate process. Through this coordinated effort, the State of Mississippi has maintained a 100% participation rate of public school districts and a 99% participation rate of public libraries in the E-Rate program.

⇒ **National Responsibility** - Through affiliations with the National Association of State Chief Information Officers (NASCIO), National Association of State Technology Directors (NASTD), and the State E-Rate Coordinators Alliance (SECA), ITS is very involved at the national level in efforts to continually improve the program. ITS routinely works with the Federal Communications Commission (FCC), the Schools and Libraries Division (SLD) of USAC, and has been called upon to testify before congressional hearings that deal with issues related to the E-Rate program. The ITS Federal Programs Coordinator has chaired SECA since 2000. SECA has a membership of forty-seven states and over 100 representatives from state E-Rate coordinators.

Schools and Libraries (E-Rate)

Discount committed to the State of Mississippi applicants for 2016 is $28,428,714.05*

*Source: http://bit.ly/2mFbYlo

Collaborative Initiatives

Building on the investment model for enterprise infrastructure, specific initiatives are implemented at the enterprise layer when the resulting solution provides services to the agency layer, benefiting the entire State. ITS has focused on advancing four statewide initiatives that include:

⇒ Cybersecurity
⇒ Network and Communications
⇒ Cloud Computing
⇒ Strategic Data Management

CYBERSECURITY

Today's evolving and dynamic threat environment demands state government focus on cybersecurity. Cybersecurity has continued to rise in importance in the eyes of elected leaders across the country, with this executive-level attention proving to be an opportunity to secure resources and support for state cybersecurity programs.

Given its current trajectory, cybersecurity risk in state governments will continue to increase as a result of innovation and use of technology and data. As are many state governments, the State of Mississippi is continually implementing new technology solutions in order to reduce costs, increase productivity, and provide critical services to citizens. Ironically, the very steps our agencies have taken to embrace these new technology solutions add to cybersecurity risks. This fact alone is impetus to view the management of cybersecurity risk as a core function of running government operations.

The National Governor's Association (NGA) release in 2013 of *Act and Adjust: A Call to Action for Governors for Cybersecurity*, provided concrete, strategic recommendations for states to diminish cybersecurity risks. Moreover, in 2016, the NGA unveiled the Chair's Initiative, *Meet the Threat: States Confront the Cyber Challenge*, placing states at the center of finding solutions to the increasingly sophisticated cyber threats facing the nation. As outlined in the work by NGA, a robust governance structure for cybersecurity is a foundational element in the development of a common framework to prepare for, respond to, and mitigate cybersecurity risks.

Unauthorized disclosure, theft, loss, destruction, or alteration of information could disrupt the financial stability of state government, deteriorate user confidence, and limit the state's ability to continue to provide mission-critical services. The protection and privacy of information assets must be a priority for all state government operations to ensure the confidentiality, integrity, and availability of mission-critical services to the employees and citizens of the State of Mississippi.

Realizing the benefits of a statewide cybersecurity focus in 2017, the Mississippi Legislature enacted legislation to formally establish the Enterprise Security Program. HB 999 enables the oversight of the cybersecurity efforts across all state agencies, including cybersecurity, services, and the development of cybersecurity policies, standards, guidelines. ITS is committed to the full, collaborative implementation of the Enterprise Security Program, with a focus on improving the state's cybersecurity posture, integrating security into the business operations of supporting the

enterprise state network and State Data Centers, operating solutions to reduce the cybersecurity risk every agency faces, and overseeing the enterprise-wide cybersecurity effort.

NETWORK AND COMMUNICATIONS

For over a quarter century, Mississippi has worked together at every level of government in the planning, development, and implementation of a Statewide Telecommunications Network through the cooperation of a consortium. Today, this Network facilitates a secure, redundant, high performance architecture that is utilized by state government, universities, libraries, community colleges, K-12 schools, and local governing authorities, with over 2,700 end sites, 99.99% Internet availability, and $601,886,486 in federal E-Rate funding.

A foundational element in the growth and stability of the Network has been the establishment of a consortium model where agencies and institutions have collaborated to procure common transport technologies, via shared specifications, terms, and solutions. The consortium approach in the procurement and operation of the Statewide Network has utilized common technology equipment and services to drive down maintenance expenses, delivered high quality and affordable technology solutions throughout the state. It has provided the potential of further volume discounts as other entities opted to participate in the consortium which improved accountability and reporting to the Legislature on the use of enterprise technologies and reduced the expense of duplicative technology services, contracts, and management.

As technology continues to evolve and paradigms shift, diverse sets of strategies and solutions must be considered in making government more efficient and effective.

As technology continues to evolve and paradigms shift, diverse sets of strategies and solutions must be considered in making government more efficient and effective. To that end, and in keeping with the mission of ITS, to "provide statewide services that facilitate cost-effective information processing," as well as "minimize duplication" while "providing common technology services across agency boundaries," ITS formed a special technical advisory committee, the Statewide Network Advisory Council, in accordance with MS Code § 25-53-5(f) and § 25-53-109(a).

The Council is a diverse cohort, comprised of government and education stakeholders critical to the success of the Statewide Network. The principal focus of the Statewide Network Advisory Council has been the investigation of emerging technologies, as well as the collaborative development of technical specifications for the next-generation statewide telecommunications network. With the current state contract for telecommunications services expiring in 2018, the Council is analyzing future needs and technologies. This collaborative work is meant to ensure that Mississippi government and education entities remain competitive and at the forefront of the global market, structuring a successful outcome that will allow for the continued establishment of a standards-based, enterprise solution that minimizes operational costs for all parties by leveraging the volume buying power of the entirety of the state.

CLOUD COMPUTING

As technology delivery models continue to transform, public sector CIOs are often challenged with reaching an equilibrium between innovation and reality – at that intersection today is a diverse set of strategies and solutions full of possibility that, when implemented, would make government more efficient and effective. In the IT ecosystem today, Cloud represents that new reality – hyper-scalability and flexibility.

Cloud, in its various derivations, embodies much of the debate often entertained in public sector; that is, how to maximize shared investment in technology in order to deliver significant return on investment, and lower the cost of service delivery. One of the more predominant promises of the virtues of Cloud lies in its near infinite scalability. Cloud is presumed to minimize, or potentially eliminate, the need to make capital investments in technology infrastructure, one of the more difficult tasks for a public sector CIO. The elimination of upfront costs with Cloud is a formidable argument, especially in public sector.

Many governments have implemented a "cloud first" policy, pushing solutions to off-premise non-state owned and operated infrastructure. While a one-size-fits-all approach is unwise, appropriately moving to cloud services does allow agencies to pool shared services and infrastructure, allows for rapid provisioning, flexibility and scalability, and measured service. This transition is disruptive to the traditional aspects of state IT, with a large impact seen in the budgeting process, as funding shifts in cost allocation from capital expenditure (CAPEX) to operating expenditure (OPEX).

To foster a dialogue on Cloud implementation strategies, ITS formed a special technical advisory committee, the Enterprise Cloud Services Council, in accordance with MS Code § 25-53-5(f) and § 25-53-109(a). This Council, functional beginning in September of 2016, has worked to define the strategy, direction, framework, and future policy for Cloud services in Mississippi state government. With the Cloud Council formation, ITS has sought a collaboratory approach, fostering an inclusive relationship with each agency participating, enabling the definition of technical and functional requirements and the establishment of a standards-based enterprise solution.

STRATEGIC DATA MANAGEMENT

The rapid, exponential growth of data in the public sector, with scant analytical tools or skills, challenges governments to identify and solve real world, and often-intractable policy problems. Public entities are often surrounded by data that is unused or unsuited for analysis. The vital importance of information sharing, data governance, and predictive analytics is regularly highlighted, as in the recently published "Top Ten Priorities for 2017" by the National Association for State Chief Information Officers (NASCIO), which cited Data Management and Analytics as seventh on the list, after joining the "Top Ten" from NASCIO for the first time in 2015.

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NASCIO noted in the 2015 publication, "Data the Lifeblood of State Government," that 35% of states governments self-reported the pursuit of big data initiatives. Also of importance in the NASCIO report is the recognition that explosive growth in the creation of data has direct ties to the rise of the Internet of Things (IoT), unmanned aerial systems (UAS), as well as body-worn cameras. Yet, given that many states have established big data initiatives, the resistance to information sharing can create an intractable inertia. In a follow-up 2016 report, "Better Decisions, Better Government: Effective Data Management through a Coordinated Approach," NASCIO describes opposition to early adoption of big data initiatives often slow or stall progress.

Stephen Goldsmith, Professor of Practice at the Harvard Kennedy School and Director of the Innovations in American Government Program, cites a Missouri data analytics initiative, between the Health and Senior Services, Mental Health, and Social Services departments, as improving service and reducing cost. Making the point that data sharing arrangements can be problematic, Professor Goldsmith references a 2014 project in Indiana focused on the reduction of infant mortality. The Indiana effort, often cited and well regarded, encountered initial legal difficulty in the release and conflation of disparate data sets. The preliminary legal concerns, successfully negotiated, resulted in definitive strategies to mitigate risks for infant mortality. In a similar vein, Susan K. Urahn, Executive Vice President and Chief Program Officer for the Pew Charitable Trusts, is leading an effort, the "Data as a Strategic Asset" program, which seeks to uncover advanced methods to identifying, collecting, and fully utilizing data to influence policy-based decision-making.

Acknowledging the difficulty that comes with sharing information in a cross-jurisdictional context, the Mississippi Legislature passed HB 649 during the 2017 Regular Legislative Session creating the Data Management Working Group. The signing of HB 649 enables the state to examine data as an enterprise asset. The Data Management Working Group is tasked with researching state agency data sources on issues related to quality, utility, and accessibility, across all branches of Mississippi state government. The findings of the research, as well as recommendations, will be reported to the Legislature by December 2018.

Platform Domain

ENTERPRISE PHYSICAL FACILITY

Description

The State of Mississippi Data Centers deliver highly available and secure mainframe, server, and storage solutions to state government entities. Completed in 2011, the Primary Data Center located in Jackson, Mississippi is the principal facility for hosting mission critical information systems and applications for the state. The Primary Data Center has over 12,000 square feet of raised floor area, failsafe features, environmental controls, and robust technology to support these applications within a hardened, resilient, and secure environment. The Co-Processing Data Center located in the downtown Jackson area provides a protected co-processing environment for state agencies seeking alternate or secondary backup site solutions. Together, these two facilities provide state government with a robust, flexible, secure, and cost effective hosted cloud environment to meet the information technology needs of the state.

The Primary Data Center contains:

- Core routers and switches supporting the state's Wide Area Network (WAN) and Metro Area Network (MAN) (along with network and security management components required for supporting the network)
- Multiple mainframes and peripherals serving the Mississippi Department of Finance and Administration (DFA), Mississippi Department of Human Services (MDHS), Mississippi Electronic Courts (MEC), and numerous other state agencies
- Virtualized server platforms for industry standard operating systems
- INTEL and RISC server platforms
- Email relays and filtering
- Mississippi Executive Resource and Library Information Network (MERLIN) warehouse server managed by DFA

Physical Facilities Attributes

Included in the Primary Data Center are the following features that contribute to a secure and highly available physical environment:

- Designed to withstand an F4 Tornado (200 MPH)
- Two diversely routed power feeds engineered for automatic failover
- Two 1.5 Megawatt generators providing 10-days support, dual-fueled for diesel and natural gas
- Two diesel tanks holding 18,000 gallons of fuel
- Four 3-ton chillers for environmental control
- One 40,000 gallon in-ground water tank to support chillers
- In-house living facilities to support critical operations
- Environmental systems are monitored 24x365
- Card and biometric secure access controls
- Intelligent fire alarm and suppression system
- Intelligent water detection and notification system
- 24x365 operations support includes armed security guards and operations staff on-site and technical engineers on call

Proposed Projects

- Continue to develop a co-processing strategy and facility
- Build upon the public/private partnership with C Spire Business Solutions for an alternative, geographically diverse, ancillary data center
- Develop a statewide governance for cloud computing services for both public and private cloud

Benefits to the State

Agencies utilizing the Primary Data Center to house IT equipment and deliver mission critical applications benefit from the following features:

- Secure physical environment monitored and staffed 24x365
- Dedicated building engineering services to coordinate maintenance and repair of electrical power, A/C, plumbing, generators, UPS, and cabling
- Fully redundant power source
- Alternate water supply
- Environmentally controlled space
- Fully equipped fire suppression system with fire and water alarms
- Highly protective environment for critical state technology assets
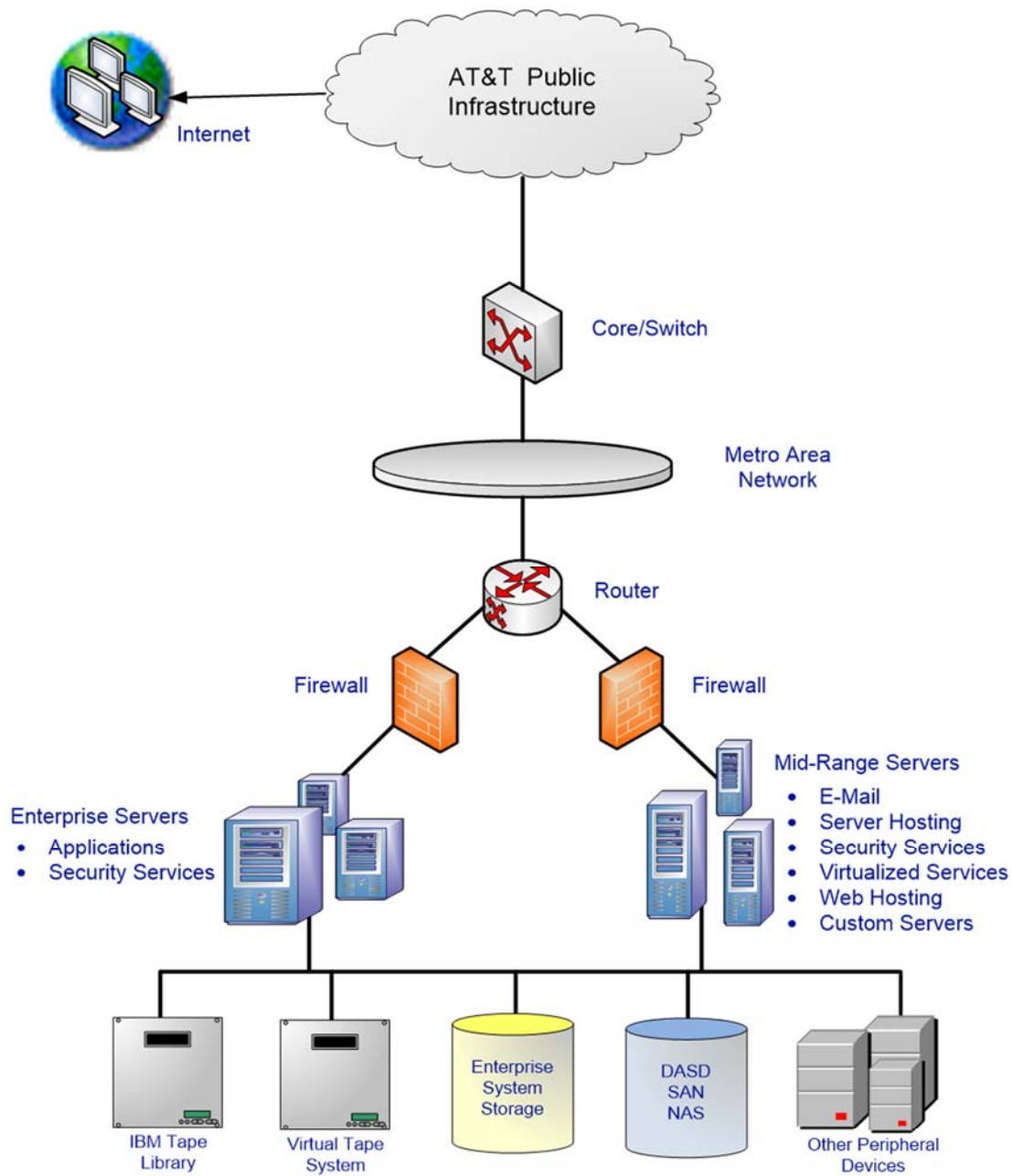
State Data Center Diagram

ANCILLARY DATA CENTER

Description

In response to the complexities of state government information technology applications, and the needs of many agencies requiring advanced backup and recovery options, ITS has expanded the State Data Center through a public-private business partnership for ancillary data center services and supplemental cloud services. This partnership provides many options such as improved disaster recovery, business continuity, and high availability capabilities. Faster recovery timeframes and the protection of the state's data information are primary concerns. This partnership also allows geographic diversity away from the capital city.

In December 2016, ITS entered into a strategic long-term agreement with C Spire Business Solutions, a Mississippi-based diversified telecommunications and technology services company, as a business partner to provide a portfolio of data center colocation and accompanying cloud-based information technology (IT) solutions available to state and local agencies. This statewide agreement gives public entities access to a broad range of services available through C Spire's newest, purpose-built and Uptime Institute certified Tier 3 commercial data center. The Ancillary Data Center is located on a 6.5-acre site at the Thad Cochran Research, Technology, and Economic Development Park in Starkville, Mississippi.

Connectivity between the Primary Data Center and the Ancillary Data Center allows the state to transition services from the existing Co-Processing Data Center to a geographically diverse facility designed specifically for data processing and high availability. By fully leveraging the two high-end data center facilities, the state will be able to manage its IT environments in the most flexible, high-performing, and cost-effective manner using the latest globally proven technology. The public-private data center partnership will enable the simplest and most administratively efficient provisioning and management of IT. The public/private partnership can enable a true hybrid cloud service across internal and external state government environments. To best serve state agencies and other local government entities, a technical architecture for network connectivity and data processing capabilities will guide the use of C Spire Business Solutions' commercial data center to compliment services currently running in the Primary Data Center.

Services Provided

- Information Technology colocation and virtual cloud services
- Proactive monitoring with 24x365 operations and on-call technical support at both data center locations
- Enhanced backup and recovery options utilizing the latest technology solutions
- Increased resiliency and accessibility with high availability options

**Proposed Projects**

- Develop a statewide architecture and policy for the effective use of the Ancillary Data Center
- Establish high speed, redundant network connectivity from the Primary Data Center and Capitol Complex fiber network to the Ancillary Data Center
- Relocate replicated storage from the Co-Processing Data Center to the Ancillary Data Center to achieve greater geographic diversity

- Integrate core networking capabilities into the Ancillary Data Center for all partner agencies utilizing colocation services offered by C Spire
- Optimize the use of the Ancillary Data Center to include core network and security equipment as well as an alternate path for Internet access

Benefits to the State

- Agencies utilizing the Primary Data Center and the Ancillary Data Center to house IT equipment and deliver mission critical applications will benefit from the following features:

  - Establishes a geographically diverse computing environment for developing a high availability solution for mission critical state government applications
  - Leverages the State Data Center resources by partnering with a Tier 3 data center company to extend the state's IT capabilities
  - Allows the state to purchase services as needed, eliminating the need for large capital expenditures
  - IT colocation allows the state to offer geographically protected IT services linked together in Jackson and Starkville for mission critical applications
  - Maximized utilization of resources with shared infrastructure
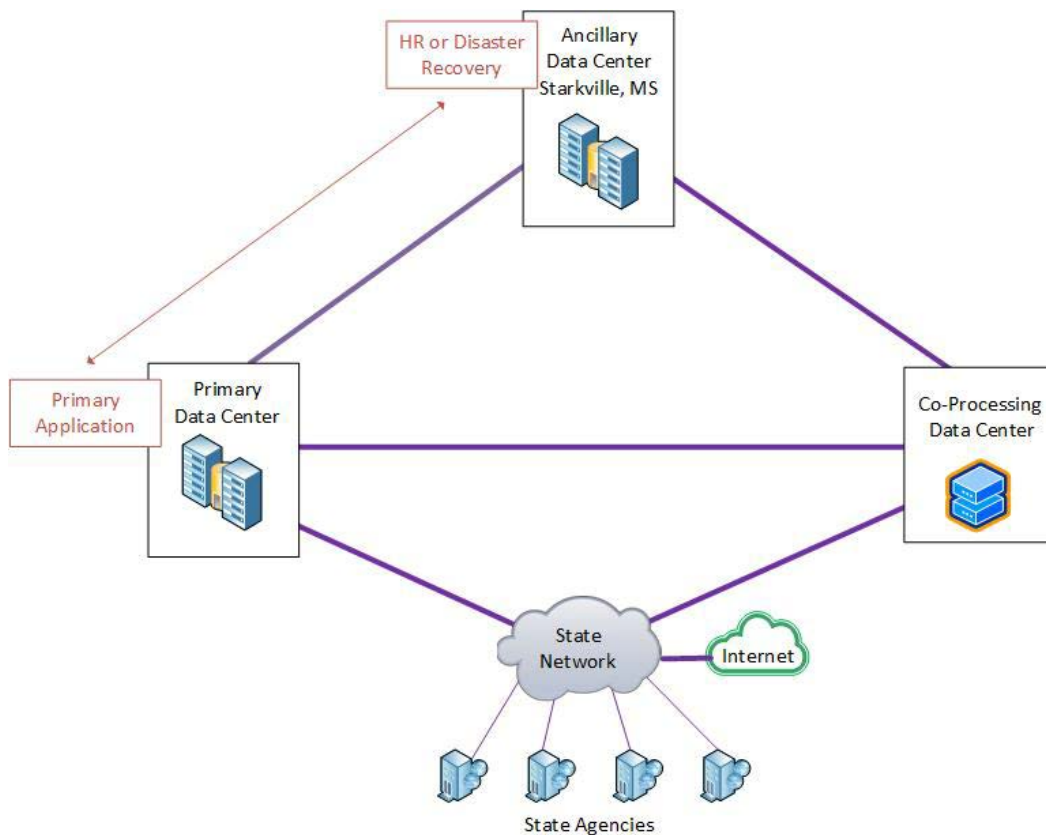
C Spire Connectivity Diagram

ENTERPRISE SERVER

Description

The databases and programs for many applications in state government are mission-critical and reside on IBM mainframes. These applications include: the Mississippi Department of Finance and Administration's Statewide Payroll and Human Resource System (SPAHRS), the Mississippi Department of Revenue's Motor Vehicle Title and Registration System, the Mississippi Department of Health's Patient Information Management System (PIMS), the Mississippi Supreme Court's Electronic Case Management System (MEC), the Mississippi Department of Human Services' (MDHS) large database applications including the Mississippi Applications Verification Reporting Information and Control System (MAVERICS), the Mississippi Enforcement and Tracking of Support System (METSS), the Jobs Automated Work System (JAWS), and the Mississippi Automated Child Welfare Information System (MACWIS). The Mississippi Department of Finance and Administration has implemented the SAP-ERP system, Mississippi Accounting System for Government Information and Collaboration (MAGIC), to manage state financial systems on a separate mainframe platform.

Hardware and Software

Hardware
- IBM z114 system
- IBM zEC12 system
- Multiple IFL engines (Linux only processor)
- Multiple zAAP processors (Java only processor)
- Multiple zIIP processors (DB2 only)
- Coupling facilities
- Multiple OSA-Express Ethernet ports
- Multiple FICON ports
- Multiple Storage Systems inclusive of DASD, SAN, and NAS disk subsystems
- IBM Robotic Tape Library Storage Subsystem
- IBM Virtual Tape System integrated with Robotic Tape Subsystem

Software
- Operating system - Z/OS features include:
  - Communications server (TCP/IP, SNA)
  - Cryptographic services (digital signatures, SSL)
  - DFSMSdfp with DFSMShsm and DFSMSdss
  - DFSORT
  - IBM HTTP server
  - JES2
  - JESMaster
  - Language environment
  - TSO/E and ISPF
  - Security server (LDAP and firewall technologies)
  - UNIX system services - Z/VM
  - SUSE LINUX

- Databases
  - ADABAS
  - DB2
  - Informix
- Transaction processing
  - CICS transaction server
- Programming languages
  - Natural
  - COBOL for MVS
  - High level assembler
  - C/C++
  - Java
  - SAS
  - CA-EasyTrieve
- System management and monitoring products
  - CA-TLMS
  - CA-7
  - CA-11
  - CA-View
  - CA-Deliver
  - CA-OPS
  - CA-SYSVIEW monitoring tools (MVS, CICS)
  - CA-NetMaster for monitoring TCP/IP
  - CA-Vantage
  - CA-Crews
  - CA-MasterCat
  - VPS for printer management
- Programmer productivity tools
  - CA-Optimizer
  - CA-TPX
  - File-AID
  - Xpediter (TSO, CICS)
  - Natural Construct

Services Provided

- Technical expertise in supported platforms
- Computing power, physical facilities, and data storage capacity to support agencies' software applications
- Secure environment for data that ensures continuous availability
- 24x365 operation with after hours on-call technical support
- Service desk that routes calls to the person most capable of providing the necessary assistance
- Acquisition and implementation of systems software products requested by state agencies
- Assistance with the installation of application systems
- Resolution of problems related to systems software operating in the State Data Center

- Backup and recovery tools and processes
- Disaster recovery services and guidance

Proposed Projects

- Evaluate the value of the IBM zSeries mainframe hardware and software for mission-critical state applications
- Utilize Linux applications on IBM zSeries as solutions for some e-Business services
- Explore options for providing seamless web access to legacy data residing in any enterprise server database or file
- Upgrade IBM zSeries operating system and support subsystems for improved performance and optimization

Benefits to the State

- Scalable, stable, available, and highly secure environment for application systems
- Shared systems that produce long-term savings with economies of scale
- Environment that supports both legacy applications and more recent e-Business applications, permitting integration on the same platform
- Backup and recovery procedures
- Annually tested disaster recovery procedures
- Mature systems management facilities
- Mature development environment
- 24x365 operation with after hours on-call technical support
- Secure, resilient, and highly available physical environment

VIRTUALIZED INFRASTRUCTURE

Description

High-performance microprocessors and high speed networking technology make it possible to deploy large applications, segmented by function, on the most cost-effective platform. Applications deployed in this virtualized environment include but not limited to:

- Mississippi Electronic Courts
- Hosted Microsoft Exchange environment supporting multiple agencies
- Mississippi Department of Finance and Administration SAP-ERP applications
- Mississippi e-Government applications
- Mississippi State Department of Health applications
- Mississippi Department of Public Safety applications

Hardware and Software

Hardware
- Enterprise Servers
- Intel Enterprise servers
- Storage – SAN and vSAN
- F5 Load Balancing and Reverse Proxy
- IBM Robotic Tape Library Storage Subsystem

Software
- z/VM
- z/Linux — SUSE Unix
- VMWare
- Apache HTTP Server
- Operating Systems
  - AIX
  - Microsoft Windows
  - Red Hat Linux
  - SUSE Linux
  - Z/OS
- Enterprise monitoring products
  - Solarwinds
  - Quest monitoring tools
  - VMware Operations Manager
- EntireX Adabas Integration
- HACMP—failover
- IBM DB2
- IBM MQSeries and Host Access Transformation Services Information Brokering
- IBM WebSphere application development tools
- IBM WebSphere Application Server
- Microsoft AD — Active Directory
- Microsoft SQL
- Microsoft Windows server operating system(s)
- Microsoft IIS server
- Sophos Mail Relay servers
- Lotus Notes Domino server

Services Provided
- ITIL Best Practices
  - Service Center — Service Desk — Single point of contact
  - All Requests and Incidents logged and triaged
  - Weekly change management meetings and documentation of major changes
  - Performance management and reporting environment
- Internal cloud service offering on virtual servers and storage
- Application failover
- Authentication/authorization
- Disk and Tape based backup and recovery
- Disaster recovery planning/business continuity planning
- Enterprise content management
- Enterprise performance monitoring/remote performance monitoring
  - Web applications (WebSphere, Windows)
  - Hardware
  - Software (operating and system)
  - Databases

- Enterprise search services
- Enterprise systems monitoring services
- High speed Internet access
- Directory services
- Operations support 24x365
- Physical security to protect access to the infrastructure
- Portal hosting services
- Project management assistance
- Data security as specified by agency
- Storage capacity—SAN (Storage Area Network), NAS (Network Attached Storage); tiered architecture and virtual storage
- System integration services
- Power management via UPS and generator backup
- Web application hosting
  - Microsoft ASP.Net
  - Java
  - Lotus Notes/Domino
- Website hosting
- Application hosting

Proposed Projects

- Transform the existing state owned virtual infrastructure into an innovative hybrid cloud offering within the State Data Center partnering with private sector vendor to deliver maximum benefit to the state
- Work with partner agencies in modernization of legacy systems into the State Data Center virtualized environment
- Expand application load balancing and proxy services
- Work with partner agencies to implement effective disaster recovery and business continuity services

Benefits to the State

- 24x365 operation with after hours on-call technical support
- Backup and recovery
- Maximize utilization of resources by sharing infrastructure
- Common infrastructure for services that support complex business processes spanning multiple applications
- Fully functioning development environment
- Fully secured environment
- No duplication of hardware and software
- Performance and availability
- Compliant with security standards
- Centrally audited and penetration tested

COLOCATION ENVIRONMENT

Description

The State Data Center offers agency partners with a colocation environment solution to house agency-owned equipment within the physical, environmental, and security attributes of the Primary Data Center. Separate from the virtualized infrastructure, the colocation environment provides an interim step in the transition from an agency-owned equipment model to the economically viable shared services business architecture and cloud related services. Agencies that utilize the colocation environment are provided with the option of full-size or half-size racks that are combination lockable; redundant electrical power (A & B side) feeds with PDU protection; and redundant network connectivity that places the agency's equipment logically behind their firewall and security measures.

Proposed Projects

- Outreach to state agency partners with information on the benefits of the Primary Data Center offerings
- Expand colocation environment within the Primary Data Center to accommodate growth and new application installs
- Leverage the C Spire colocation contract for ancillary data center services

Benefits to the State

- Maximize the investments already made by the agencies for data processing equipment
- Improved physical, security, and environmental conditions over many state office buildings for running mission critical applications
- Improved proximity to core enterprise compute, network, and storage resources to aid in the transition to a shared services business model
- Improved co-processing, high availability solution for running mission critical applications

GIS INFRASTRUCTURE

Description

The Mississippi Geospatial Clearinghouse (MGC) provides access to a comprehensive spatial information warehouse of the Geographic Information Systems (GIS) resources of Mississippi. This warehouse was developed for use by state and local government, academia, and the private sector. The goal of the MGC, www.gis.ms.gov, is to make the application of spatial information technologies within the State of Mississippi more efficient by reducing the duplication of spatial data production and enhancing distribution through effective cooperation, standardization, communication, and coordination. ITS continues to work with the Mississippi Coordinating Council for Remote Sensing and GIS and the Mississippi Department of Environmental Quality in the enhancement of the MGC.

Services Provided

- Manage GIS Clearinghouse application through existing services contract
- GIS professional services and consulting, which allows agencies to have access to technical expertise in GIS information technology

- Physical facilities, computing power, and data storage capacity to support agencies' GIS software applications
- Express Product Lists (EPL) for GIS hardware and software for the acquisition and implementation of systems software products requested by state agencies
- Contract services to provide GIS application and database design and hosting
- GIS web map services
- GIS data and application backup and recovery

Proposed Projects

- Host and support of GIS efforts for the Mississippi GIS Clearinghouse and for agencies' GIS applications
- Reduce direct cost of GIS Clearinghouse application through continued use of the managed service contract and supporting infrastructure

Benefits to the State

- Integration of GIS technology into business processes
- Cost sharing for implementing the hardware, software, and technical staff to support the complex architecture that produces long-term savings with economies of scale
- Scalable, stable, readily available, and highly secure environment for application systems
- Existing backup and recovery procedures plus annual testing of disaster recovery procedures
- Mature systems management facilities
- Secure, resilient, and highly available physical environment

ENTERPRISE MESSAGING SERVICES

Description

- Enterprise Messaging Services (EMS) within the State Data Centers is comprised of two distinct services:
  - Email Relay Services is the delivery and receipt of electronic messages between state entities and across the Internet. ITS provides an infrastructure composed of hardware and software that can provide secure and filtered messaging services across the state infrastructure.
  - The state's preferred hosted email solution is Microsoft Exchange/O365 that is provided under state contract as part of the O365 suite. The cloud messaging solution provides email, calendaring, shared folders, electronic archive, mobile device connectivity, mailing lists, etc. on a secure, highly available platform within the Microsoft O365 environment.

Email Relay Services Hardware and Software

Hardware
- Virtual servers
  - Internal mail relay servers (interagency and outbound)
  - External mail relay servers (inbound gateway)
  - SPAM and virus detection, email quarantine

- Internal fallback relay (queues mail for unreachable servers)
- Emergency internal mail relay server (interagency and outbound)
  - Physical servers
    - Internal mail relay servers (interagency and outbound)
    - External mail relay servers (inbound gateway)
    - SPAM and virus detection, email quarantine

External mail relay servers (inbound gateway) software
- Red Hat Linux operating system
- Sophos PureMessage for Unix

Services Provided
- Microsoft Certified Active Directory Infrastructure
- Relaying of mail, SSL/TLS encryption
- Virus scanning of all inbound, outbound, and intrastate email
- SPAM filtering of all inbound email
- Mailbox hosting – O365 cloud solution

Proposed Projects
- Consolidate directory services into a statewide offering for state government agencies

Benefits to the State
- Up-to-date patching, versioning, and upgrades
- 24x365 operation with after hours on-call technical support
- Redundant servers
- Secure environment
- Backup and recovery

Communications Domain

STATEWIDE VOICE NETWORK

Description

Statewide voice communications are provided for state entities and local governing authorities within the Capitol Complex, the Greater Jackson Metropolitan Area, and across the state though a variety of communications services. In 2005, the state entered into a long term contract with AT&T to provide traditional telephone services by means of the Public Switched Telephone Network (PSTN). These statewide services include local and long distance calling, Private Branch Exchange (PBX) trunking, business lines, and Centrex. Predominantly, Centrex is the service of choice for many small, rural agency offices within the state. Centrex is a central office based voice communications system that provides many of the features and functionalities of a PBX or Key Telephone System (KTS) without large capital investments. AT&T has made significant upgrades in their network, including upgrading all analog switches to digital switches. Therefore, Centrex services are now currently available in all of AT&T's 200 Central Offices across the State of Mississippi. AT&T recently added their Hosted Voice Service (HVS) service offering to the contract. HVS is a cloud-based Voice over IP (VoIP) solution, which will provide additional features over the existing Centrex and business lines and is the potential replacement for the state's legacy Centrex and business lines. Jackson State University has migrated their entire campus to HVS and several city/county governments have expressed interest in the product.

Voice communications in the Capitol Complex are provided through centrally managed Avaya Aura 7 Communications Manager servers with remote gateway servers strategically located within the Capitol Complex. The IP-based system provides a robust, resilient, and feature rich environment for local and long distance calling. Agencies that connect to the system include: Mississippi Department of Transportation (MDOT); Mississippi Department of Public Safety (MDPS); Mississippi Department of Environmental Quality (MDEQ); Mississippi Department of Human Services (MDHS); Mississippi Department of Health (MSDH); Education and Research (E&R) Complex; the Sillers Building; the Woolfolk Building; Mississippi Agriculture and Commerce (MDAC); Mississippi Secretary of State (SOS); Mississippi Veteran's Home Purchasing Board (VHPB); Mississippi Gaming Commission (MGC); the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP); and others. Over 40 agencies have access to the system via the statewide area network.

Hardware and Software

Hardware
- Fully redundant Avaya Aura 7 Communications Managers
- 106 locally survivable media gateways
- 36 expansion port networks
- Fully redundant Avaya Aura Messaging voice mail servers
- Fully redundant Avaya Session Manager servers
- Peripheral servers providing administrative and support functions

Software
- AVAYA Centre Vu CTCV
- AVAYA Systems Manager software suite
- AVAYA Session Manager SIP management suite
- AT&T ccConnect service request entry software
- AT&T Business Direct account management portal
- Calero MySoft telecommunications management suite

Services Provided

- Local calling access provided through PBX trunking, Centrex, and business lines for remote office locations statewide
- Local, intrastate, interstate, and international calling provided through the state's voice communications network
- Universal authorization codes that verify long distance calling by assigning a unique authorization code to each state employee and allows a person to place a long distance call from any state-managed phone statewide (beneficial for state employees traveling to a remote office)
- Toll free numbers provided to an agency's customers to support agency business at a cost-effective rate
- Voice mail provided through either AT&T's Memory Call service or through the state's Avaya Aura Messaging voice mail system for customers in the Capitol Complex to efficiently manage telephone messages for state employees
- On-demand assistance via call center applications to Capitol Complex customers for managing high call volumes while reducing operating and maintenance costs
- Various types of call center employee productivity reports for customers using the software application Centre Vu Supervisor
- Audio, web, and event conference calling at affordable contracted rates
- All voice cabinets and gateways communicate via TCP/IP and controlled deployment of VoIP to the desktop where feasible
- Detailed billing, provided through a comprehensive monthly bill designed to assist agencies with managing their telecommunications services through itemized call detail and inventory reporting at the individual user level

Proposed Projects

- Evaluate impact of next generation networking against traditional voice communications infrastructure
- Continue controlled deployment of real-time IP based services such as IP Video and VoIP

technologies
- Implement Session Initiation Protocol (SIP) and Session Border Controllers (SBC) for SIP communication devices and local trunking access within the Capitol Complex telephone system
- Migrate remote office locations from traditional telephone services to hosted VoIP managed services

Benefits to the State
- Superior telecommunications services to the Capitol Complex and across the state, including a manageable and cost-effective communications infrastructure
- Centralized management of all telecommunications services
- Consistent, reliable, and cost effective telecommunications services statewide
- Itemized call detail and billing
- 24x365 access to voice applications, services, and trouble reporting
- Reduce the administrative cost of processing telecommunications bills by consolidation
- Provide an audit process to ensure the best possible rates for telecommunications services
- Provide and maintain a more accurate inventory of telecommunications facilities statewide

STATEWIDE DATA NETWORK

Description

In 2005, AT&T was awarded the contract for telecommunication services which included the data network products and services to enable the state to migrate from the legacy statewide Frame Relay/ATM Backbone Infrastructure to new technology utilizing Multi-Protocol Label Switching (MPLS). Today, this network facilitates a secure, redundant, high performance wide area network architecture utilized by state government, universities, libraries, K-12 schools, and local governing authorities. The contract allows for all products and services to facilitate the co-existence of all governmental entities on the network with multiple options for connectivity, performance, and quality of service. Although BellSouth was purchased by AT&T in December 2006, the contract remains intact for all contracted services as well as provisions to add new and enhanced services to meet the specific needs of the state.

As part of the implementation of MPLS infrastructure in Mississippi, AT&T provides firewall, intrusion prevention, and filtering services at the Internet access point to the state's network at no additional cost to the state. These offerings allow customers the flexibility to utilize these services, yet avoid the cost associated with these services and products at each site they have on the network.

Some of the current applications on the statewide network are:
- LAN/WAN interconnection
- High speed image transfer
- Host-to-host data transfers
- Client/server applications
- TN3270 applications
- Statewide E-mail
- Supercomputing access

- Remote systems management
- Intranet web based applications
- Internet access, services, and web based applications
- Voice over IP
- H.323 IP-based video
- GIS
- Telemedicine

METRO AREA FIBER NETWORK

Description

The Metro Area Network (MAN) supports high speed data, voice, and video connectivity for all major state government buildings in the Capitol Complex, the E&R Complex, as well as buildings along the diverse fiber paths between the two fully redundant core network hubs. The infrastructure includes fiber connectivity within and between buildings plus the necessary routing and switching hardware. The resulting fiber network provides both redundant and resilient access to the State Data Centers (enterprise servers, e-Government portal, and the state voice communications platform), the local and long distance voice network, and the Internet by utilizing Virtual Switching System (VSS) architecture. The MAN is also a gateway to other agency sites statewide via the AT&T MPLS network.

HARDWARE
- 2 fully redundant and resilient Carrier class routers
- 2 fully redundant and resilient Enterprise High Capacity Layer 3 VSS switches
- 2 Enterprise resilient Layer 3 switches for the Primary Data Center and Co-Processing Data Center networks
- Fully redundant and resilient data center class switching infrastructure for the Primary Data Center and Co-Processing Data Center networks
- Fully redundant security infrastructure (Firewall, VPN, and IPS)
- State owned fiber connecting the following Mississippi government buildings in the MAN via Ethernet (from 100Mbps to 10 Gbps)
    - Department of Transportation Headquarters
    - Department of Transportation Lab
    - Walter Sillers
    - Department of Corrections
    - New Capitol
    - Woolfolk
    - Governor's Mansion
    - Department of Human Services
    - Department of Health
    - Natural Science Museum
    - University of Mississippi Medical Center
    - Department of Public Safety
    - Department of Agriculture and Commerce - Ag Museum
    - Workers Compensation Commission
    - Institutions of Higher Learning

- Public Broadcasting
- Library Commission
- Department of Wildlife, Fisheries, and Parks
- School for the Deaf/Blind
- Secretary of State (Heber Ladner)
- Department of Education
- Department of Archives and History
- Department of Agriculture and Commerce Headquarters
- Public Employees' Retirement System
- Ethics Commission
- Robert E. Lee
- Robert G. Clark, Jr.
- Department of Environmental Quality (Amite Street, North State Street)
- 660 North Street
- 620 North Street
- ITS Office and Data Center

Services Provided

- TCP/IP communications and addressing
- Virtual Route Forwarding and private VLANs
- H.323 video services including firewall traversal
- SNA encapsulation and emulation
- Domain Name Services (DNS)
- 24x365 Network monitoring, management, and reporting
- Redundant and resilient Internet access and related services

Proposed Projects

- Install 10 Gbps network access into state government buildings within the Capitol Complex fiber network
- Work with partner agencies for the migration of agency applications and resources into the Primary Data Center
- Work with partner agencies to build high-availability solutions between agency locations and the Primary Data Center

Benefits to the State

- Access to a managed, high bandwidth, fully redundant and resilient, multi-protocol network connected to any state resource
- Access to a secure managed network, taking advantage of the technology investment implemented within the MAN
- Lower overall costs as a result of to the economies of scale of a shared infrastructure
- Expand functionality to facilitate disaster recovery and co-processing of information and services
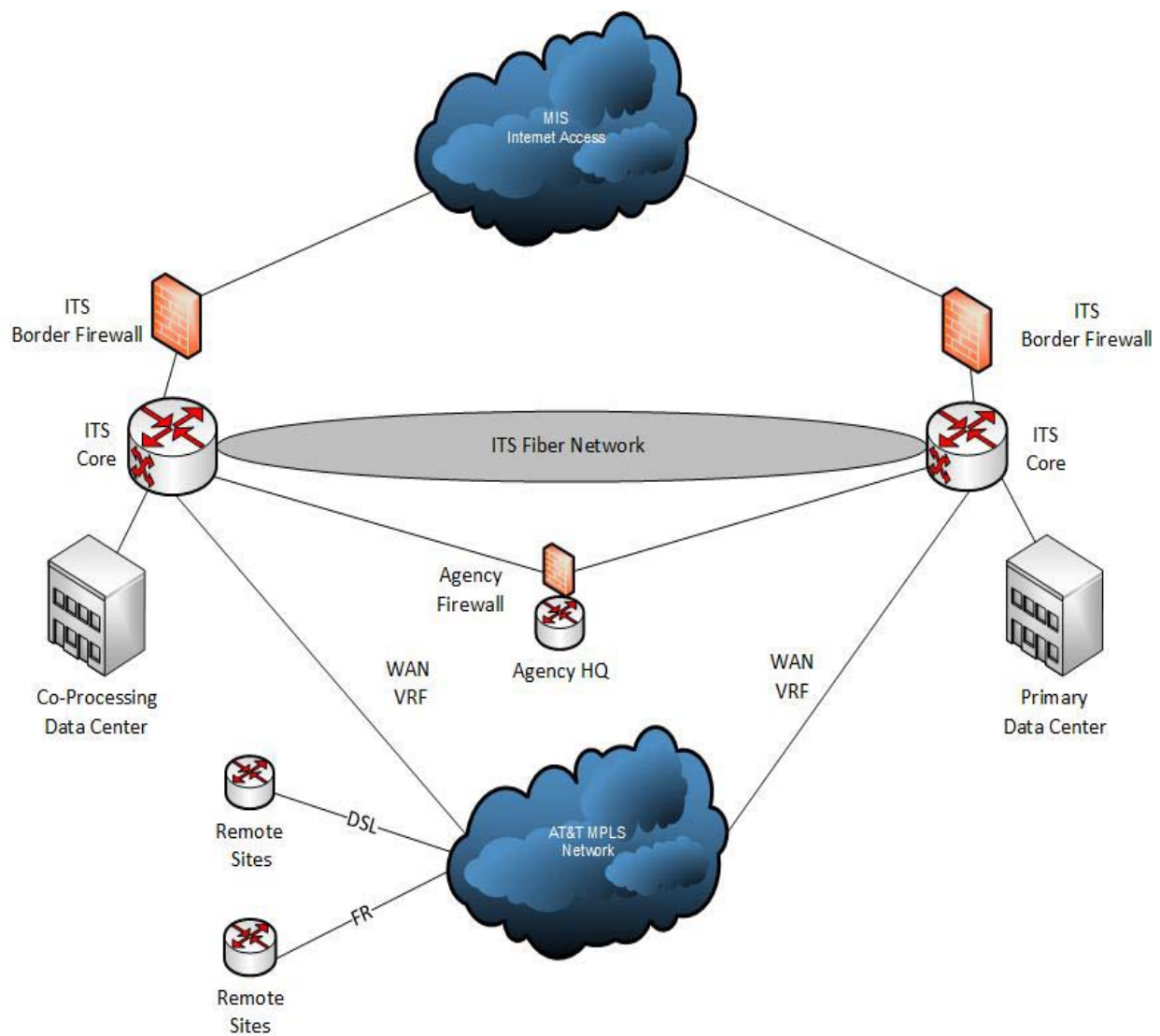
Logical Statewide and Metro Area Fiber Network Diagram
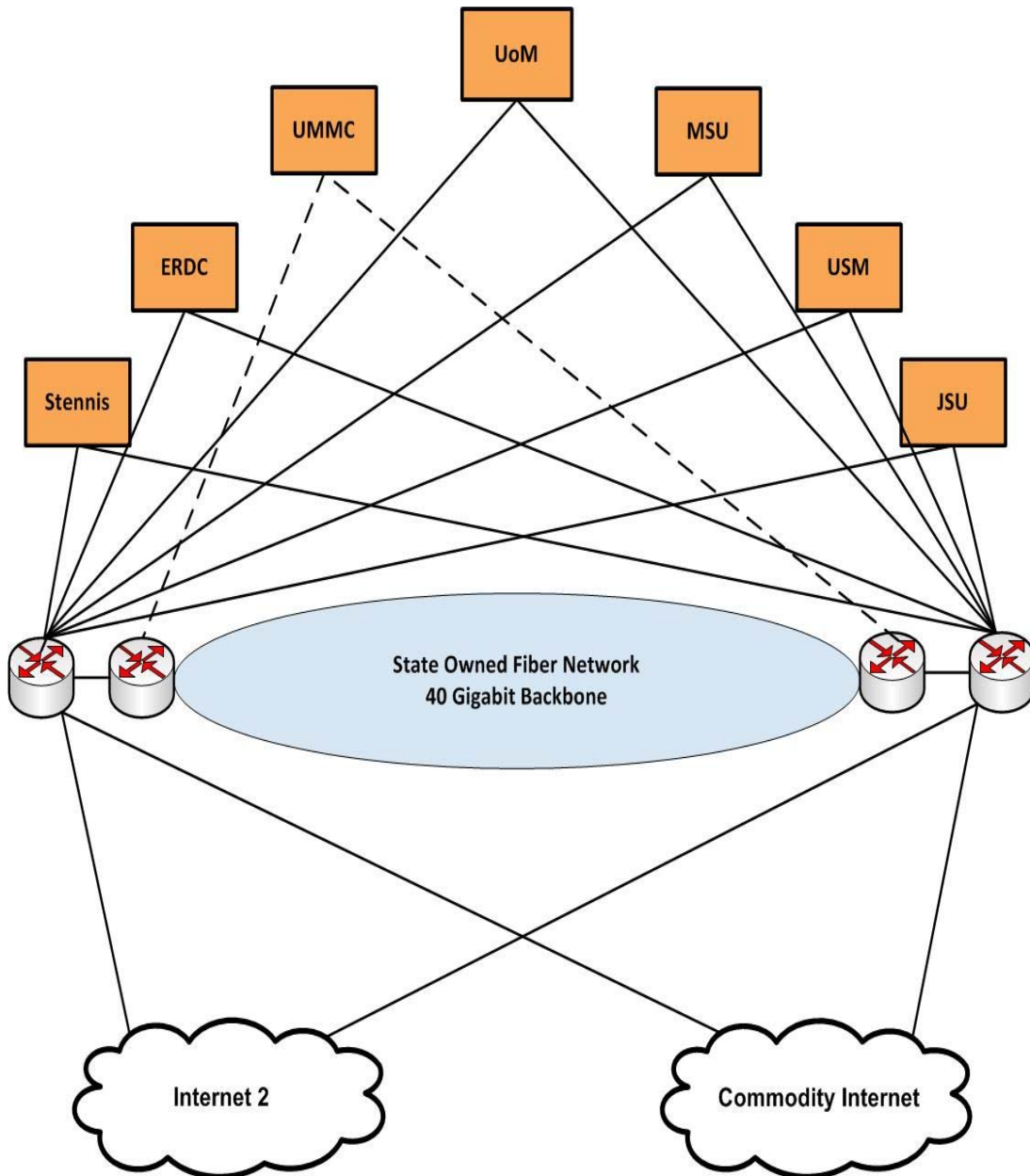
MISSISSIPPI RESEARCH NETWORK

Description

The Mississippi Research Consortium's (MRC) purpose is to develop and sustain nationally competitive research programs in the State of Mississippi. Formed in 1986, the MRC includes Mississippi's four research universities: Jackson State University, Mississippi State University, the University of Mississippi, and the University of Southern Mississippi. The organization has received praise from the National Science Foundation and others and has been cited as a national model for how to best form a state science and technology infrastructure. The primary goals of the MRC are to:

- Develop a research infrastructure to support education and extend technology development in Mississippi
- Foster research funding opportunities and increase interaction with federal agencies
- Develop and share resources
- Improve science education opportunities for students elementary through college
- Make the most of human potential and provide technical assistance
- Enhance economic opportunities for the State of Mississippi

For several years the MRC sought support for the build-out of a research network within Mississippi, much like their peers in other states. The research universities extended their reach to other possible research entities including the Stennis Space Center, the University of Mississippi Medical Center, and the Engineering Research and Development Center at the US Army Corps of Engineers in Vicksburg, Mississippi. During the 2010 Legislative Session, support was garnered by Governor Haley Barbour to establish a robust and resilient research network as part of Senate Bill 3184. This legislation, by leveraging the existing State Master Contract for Telecommunication Services, authorizes the design and implementation of a statewide, high capacity network, which specifically meets the needs of our research institutions. The legislation also authorized payment for the research network to be made through a tax credit voucher in lieu of an equal amount of cash payment. The total amount of tax credit authorized under this bill in any fiscal year cannot exceed $2 million. This legislation remains in effect through June 30, 2018.

The research network is called the Mississippi Optical Network (MissiON) and provides the infrastructure to foster new educational opportunities and to keep Mississippi's research universities nationally competitive among peer institutions. The network design consists of two diversely routed managed-wave 10 Gbps connections (providing a total of 20 Gbps capacity) from each research location back to the MissiON core infrastructure. Access to the research network is provided through a "connector" agreement with Internet2, which has a point of presence (POP) also located in Jackson, Mississippi. The network provides the research universities with a high-performance, high-capacity optical network with access to national research networks such as Internet2, Louisiana Optical Network (LONI), Transitrail-Commercial Peering Service (TR-CPS), and National LamdaRail (NLR). The research network reached full deployment in early 2012.

Research Network Diagram

Proposed Projects

- Work with the research universities to add the other state IHLs to the research network including: Alcorn State University, Mississippi University for Women, Delta State University, and Mississippi Valley State University
- Work with the research universities to identify benefits of peering regionally with other state research networks
- Upgrade the MissiON core infrastructure to support diverse 100 Gbps connectivity to Internet2

Benefits to the State

- Increases capacity for the research universities from 1 Gbps to 20 Gbps
- Provides redundancy from the research entity to the Internet2 connection
- Provides flexibility for changes in Internet2 providers
- Allows for collaboration between the research universities and the state network
- Provides opportunities for disaster recovery capabilities between entities
- Allows the state to use university volumes in negotiating future contracts
- Helps research universities compete for research grants/funds
- Helps promote economic development both regionally and statewide
- Allows for more collaboration and the sharing of resources statewide
- Provides Mississippi students opportunities they might not otherwise have
- Helps recruit the best and brightest researchers to Mississippi
- Helps to expand telecommunications infrastructure and technology to all parts of Mississippi
- Provides universities with access to low cost commodity Internet without the need for additional circuits

INTERNET ACCESS

Description

Internet access is provided through the state contract with AT&T which serves as the state's current Internet Service Provider (ISP). The contract includes options for dedicated access through AT&T's Managed Internet Services (MIS) and cloud-based access through the AT&T MPLS network. The preferred option for a specific location depends on bandwidth, network design, application, and a variety of ancillary features available with both offerings.

The importance of a robust, diverse, and resilient Internet connection cannot be overstated since it impacts the delivery of educational content and on-line testing, public information access and commerce through the state's portal, and connectivity to other logical networks for collaboration. Access to the Internet for all state entities is currently provided over the dedicated MIS option which affords the state with redundant multi-Gbps routes from Jackson, Mississippi to Atlanta, Georgia and Jackson, Mississippi to New Orleans, Louisiana.

The current aggregate Internet capacity for the state is approximately 15 Gbps and continues to grow as new web-based applications and e-commerce needs are introduced on the network for the delivery of statewide services. To protect this vital Internet lifeline, ITS contracted with AT&T for a Distributed Denial of Service (DDoS) offering to protect the state's Internet services in the event of an attack.

Services Provided

Listed below are the services offered by ITS and/or AT&T associated with Internet access. State entities and local governing authorities can take advantage of these services to provide access to their Internet users, or they may elect to configure their own Internet application servers to meet their business needs. These services include:

- Email
- Internet mail relay, virus protection, and SPAM filtering
- Content filtering, management, and reporting
- Web services including www.ms.gov
- Domain Name Services (DNS)
- Security services, including firewalls, authentication servers, Virtual Private Networks (VPN), and Intrusion Protection Systems (IPS)

Proposed Projects

- Upgrade the state's overall Internet capacity to meet agency and institutional demands

Benefits to the State

- High speed, dedicated access to the Internet (the limiting factor is normally the local access circuit)
- Highly scalable solution for all participants
- Low cost solution based on economies of scale and volume purchasing from the vendor
- Security services (firewall, IPS, DDoS, filtering) included with MPLS Internet access

Security Domain

INFRASTRUCTURE SECURITY

ITS provides core and perimeter defense for state agencies through cooperative efforts of the internal operational units. Each statewide enterprise infrastructure domain has security elements as described below:

State Data Center Physical Facilities

- Security camera surveillance with activity monitoring and archive
- Card access control system with biometric scanners, as needed
- Lockable racks and the capability to create caged environments
- 24x365 on-site facility and grounds security officer protection

Enterprise Server Component

- Security access services that includes Lightweight Directory Access Protocol (LDAP) server, network authentication service, and firewall technologies
- Cryptographic services that include a system secure sockets layer (SSL) and the integrated cryptographic service facility
- Mainframe source modules, run-time modules, and data sources protection through Resource Access Control Facility(RACF)

e-Government Infrastructure (State Portal)

- Access manager that includes proxy server, LDAP directory services, access control, and SSL
- Transport Layer Security (TLS) encryption on mail relays
- Mississippi Interactive – Hosting infrastructure, security, and coordination of services in a dedicated Demilitarized Zone (DMZ) with controlled access from the state network and only VPN access from the Internet

Network Security

- Multiple perimeter and State Data Center firewalls used to assist in preventing unauthorized activity
- Multiple perimeter and State Data Center Intrusion Prevention Systems (IPS) to assist in

detecting, reporting, and terminating unauthorized activity

- Virtual Private Network (VPN) connectivity for the implementation of IPSec Virtual Private Networks and qualified SSL clients to secure connectivity of third parties to state resources as well as access to the state network by remote state employees
- Detection of security events using both behavioral and signature-based methods combined with monitoring and analysis of net flow
- Access control system that utilizes multi-factor authentication to enforce access and authentication policies for networking systems and components
- Traffic filter that monitors network access across all ports and protocols for rogue activity and blocks infected internal endpoints from accessing malware command and control hosts
- Advanced malware protection that utilizes intelligence, known file signatures, and dynamic file analysis technology to block known malware, policy-violating file types, and communications trying to infiltrate the network
- Security intelligence that monitors traffic based on static and dynamic intelligence sources and blocks traffic, as necessary, based on reputation
- Access control list at the switch and router level to protect agencies by stopping propagation of worms, viruses, and other threats
- Guest wireless network that offers Internet access for third parties that are not permitted access to state network resources
- Secure file transfer application for the secure handling and distribution of sensitive information

ENTERPRISE SECURITY PROGRAM

- Monitor network and maintain historical statistics
- Manage and support SSL, cryptographic services, and digital signatures
- Align enterprise security policies, standards, plans, and other cybersecurity documents with current security methodologies and industry standards
- Utilize current cybersecurity methodologies and industry standards in the development of enterprise strategic objectives and initiatives
- Collaborate with state agencies and external entities regarding interoperable, scalable, cost-efficient enterprise cybersecurity services and technologies
- Manage security vulnerability management tools and leverage internal/external partners for coordinating regular security assessments and associated remediation efforts for enterprise core and perimeter devices
- Disseminate persistent and regular cybersecurity threat and vulnerability information
- Coordinate regular Security Council Meetings with agency Information Security Officers
- Maintain ongoing operational responsibilities for enterprise core and perimeter defense solutions
- Analyze new enterprise security solutions for the Enterprise State Network
- Analyze new security solutions for the State Data Centers
- Participate in designing, planning, and implementing enterprise projects to ensure industry standards for cybersecurity are implemented
- Perform, coordinate, and promote security education and awareness

- Manage enterprise security monitoring and event correlation tools and leverage internal/external partners for the identification of security incidents
- Distribute detailed notification alerts of detected security incidents
- Promote and coordinate cybersecurity exercises

Proposed Projects

- Develop an RFP for the acquisition of an enterprise virtual private network (VPN) solution for replacing ITS' exiting hosted VPN solution
- Expand the use of multi-factor authentication for controlling access to enterprise core and perimeter devices managed and supported by ITS staff
- Investigate options for enhancing vulnerability scanning efforts to include scanning application-level vulnerabilities
- Refine the tools and processes required to continuously acquire, assess, and take action on new information in order to identify vulnerabilities, threats, and remediate risks minimizing the window of opportunity for attackers
- Research the cybersecurity insurance market for available coverage to mitigate losses from a variety of cyber incidents, including coverage for data destruction, data theft, network damage, and liability of losses to others
- Secure funding and support for the acquisition and implementation of an enterprise perimeter defense solution to enhance the ability to protect State of Mississippi assets against attacks by detecting and filtering unwanted software, malicious code, and traffic to malicious sites from user-initiated Internet traffic
- Develop an RFP for the acquisition of an enterprise security education and awareness training solution to be utilized by agencies for increasing the cybersecurity awareness of state employees

Benefits to the State

- Development of a risk aware culture for investing in effective and efficient cybersecurity strategies, solutions, and resources capable of reducing the evolving data threat
- Management of enterprise security program activities for providing an enterprise-wide approach to prepare for, respond to, and reduce cybersecurity risks
- Management of enterprise core and perimeter cybersecurity solutions for protecting the enterprise state network and gaining situational awareness

Enterprise Management Domain

DISASTER RECOVERY

Description

Every year state government becomes more dependent on computerized data and the ability to deliver timely information to its citizens through online applications. It has become a critical function for an agency to recover quickly from any service disruption or disaster situation that could affect computer hardware, software, data, and networks. In the event of a disaster situation, the state must be able to bring significant infrastructure components back online and be operational as soon as possible. The sophistication and complexity of today's technologies have increased the challenge and complexity of a sound disaster recovery solution.

The state inventories and makes adjustments to the list of hardware, software, and network components that are tested during the state's annual disaster recovery test. The infrastructure disaster recovery plan is updated annually and distributed to participating agencies to ensure a successful test.

ITS currently has a contract with IBM Business Recovery Services to facilitate a recovery should a significant disaster strike. The coverage is available to other agencies as a service under contract with IBM. This service includes:

- Six weeks of hot-site access
- Six months of cold-site access
- Mainframe capacity to handle ITS customers
- Mainframe peripherals such as disk storage, tape drives, and printers
- Open Systems capacity to handle mission-critical UNIX and Windows applications including email services
- Routers, switches, and channel extenders to switch the Metro Area Network and Statewide Frame Relay/ATM Backbone Network to the hot-site
- Internet VPNs to connect to the hot-site
- Mail processing facilities to print, process, and mail important documents
- Internet access

Services Provided
- Production disaster recovery facilities for all mainframe applications
- Production network access to the disaster recovery facilities for mainframe applications should a disaster strike the Primary Data Center
- Disaster recovery for the networking infrastructure should a disaster strike any building within the Metro Area Network (MAN)
- Disaster recovery plan that is distributed to customers and can be used as a guide for agency disaster recovery planning
- Annual disaster recovery testing

The state also has a public-private partnership with C Spire to provide disaster recovery related services of data center colocation and accompanying cloud-based information technology (IT) solutions to state and local agencies. The technical roadmap involves greater integration with the Ancillary Data Center for fully redundant, hot site capable data center services.

INFRASTRUCTURE ADMINISTRATION

Description

An infrastructure that is as sophisticated as the State of Mississippi's requires a level of administration that is responsive, efficient, and effective. With much of the business of the state becoming increasingly dependent on the e-Government platform, Metro Area Fiber Network, and statewide networks, it is imperative that the business be supported by timely and well-conceived plans for administering, monitoring, and managing the components.

The function of network management is carried out by a group of trained network technicians located in the Primary Data Center. Network support is a 24x365 operation that provides help desk support, technical troubleshooting, network performance monitoring and tuning, coordination of new site installations, and planning for major network expansions and technology migrations.

Currently, many different state entities are performing Level-1 troubleshooting for their respective customer bases. Level-1 support means handling those problems that are common, easily addressed, and for which handling procedures already exist. Level-2 support means handling those problems that are uncommon, complex, and often require a higher level of expertise.

Examples include:
- The Mississippi Department of Education provides Level-1 support for the 147 school districts.
- The Mississippi Library Commission provides Level-1 support for all public libraries.
- The Mississippi Community College Board provides Level-1 support for all community college campuses.
- The Mississippi Department of Public Safety provides Level-1 support for criminal information center sites.
- The Mississippi Public Broadcasting and community college staffs currently staff and support the video network control center and provide help desk, conference and class scheduling, and other technical functions for the H.320 and H.323 video network participants.

- ITS provides Level-1 support for all other agencies and Level-2 support for the groups listed in the example. Larger agencies may provide Level-1 support for their applications and networks. ITS provides Level-2 support in those cases.
- ITS has implemented network management and monitoring tools.
- The administration of the e-Government component and enterprise server component is also the responsibility of ITS personnel. Each of the infrastructure components has unique tools to aid in the proper management of the environment.

Hardware and Software

Most of the infrastructure components have administration and management elements included as software. These products for the enterprise server component and the e-Government component have already been listed. Because the network management environment is physically a distinct application environment, it is described below:

Hardware
- SUN servers
- Microsoft servers

Software
- Solarwinds
- Visio
- CA-Service Desk

Services Provided

- Monitoring of all the components of the infrastructure
- Collection and distribution of performance and usage data for all components
- Collection of data for capacity planning and/or IT systems design
- Bill management
- 24x365 operation with after hours on-call technical support

Proposed Projects

- Implement the architecture to utilize the Ancillary Data Center for enhanced backup and recovery services for core IT infrastructure
- Integrate the telecommunication system and the new service desk
- Enhance monitoring capabilities and user interfaces
- Enhancements to log management solution through third party monitoring application
- Expand existing business recovery services contract to:
  - Support enterprise server recovery
  - Update configuration and modify equipment on contract as needed for recovering additional applications and virtual infrastructure; add individual agency infrastructure environments requested by customer agencies; add the virtual tape system; and to enhance virtualization recovery support features

Benefits to the State

- Support for all infrastructure services
- Access to performance, capacity, and billing data as needed
- Secure environment

- Controlled test and production environments
- Extensive disaster recovery services
- Annually tested disaster recovery plans
- Periodically updated disaster recovery procedures which include new platforms and applications
- Restoration of data processing for the agency applications utilizing back-up and recovery services at the Primary Data Center in 48-96 hours should a localized disaster occur

Summary of Proposed Projects

TECHNOLOGY DOMAINS

PLATFORM

COMMUNICATIONS

SECURITY

ENTERPRISE MANAGEMENT

3+ Years
- C Spire full integration
- Statewide AD service

2-3 Years
- Modernize agency applications
- Expand load balancing
- Reduce GIS costs
- Expand SDC colocation
- Migrate remote offices to VoIP
- MissiON expansion to all IHLs
- MissiON regional collaboration
- MissiON 100 Gbps upgrade

1-2 Years
- Co-processing strategy
- Cloud Governance
- Mainframe refresh/upgrade
- Mainframe web access
- zLinux applications
- SDC hybrid cloud
- Partner agency DR/BC
- C Spire policy
- C Spire network connectivity
- HA Storage relocation to C Spire
- Implement SIP
- 10 Gbps Capitol Complex
- Upgrade Internet bandwidth
- Migration remote offices to VoIP
- Continued deployment of VoIP
- NextGen Voice
- Enterprise Web Gateway
- Research cybersecurity insurance
- Statewide cybersecurity training solution
- Implement C Spire Architecture
- Expand multi-factor authentication
- Enhance vulnerability scanning
- Enterprise Virtual VPN
- Refine cybersecurity information tools
- Integrate telecom w/service desk
- Expand existing DR services
- Enhance Monitoring

Legend:
- ● Run
- ● Grow
- ● Transform

Technical Research and Future Projects

ITS focuses on emerging technology initiatives by researching, testing, assessing, and recommending new technologies. This effort concerning emerging technology is used to improve the architecture and implementation of technologies across the entire shared technology infrastructure, both by direct implementation and by influencing design decisions of the supporting infrastructure. As the effort progresses, it expands into a collaboration between ITS, state agencies, and state institutions.

TECHNICAL RESEARCH

The following topics are being researched by ITS for either specific non-enterprise applications or an understanding of the technology's implications to the enterprise infrastructure:

- Alternative Network Access
- Continuous Vulnerability Assessment
- Mobile Device Management
- Unified Communications and Collaboration
- Virtual Desktop Infrastructure

INFRASTRUCTURE INITIATIVE RESEARCH

The following topics are being researched by ITS as potential Enterprise Initiatives (The research may lead to these topics becoming projects implemented at the Enterprise Layer.):

- Correlated Log Management
- Identity & Access Management
- Managed Service Provider for Consulting Services
- Secure Web Gateway
- Software Defined Networking

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